

What is claimed is:

1. A method of producing a live chick from an oviposited unfertilized avian egg in the shell, wherein the egg comprises a yolk enclosed by a membrane and an ovum, comprising activating the ovum and incubating the egg until hatching.
2. The method of claim 1, wherein the avian egg is from a chicken.
3. The method of claim 1, wherein the avian egg is from a turkey.
4. The method of claim 1, wherein multiple eggs are activated substantially simultaneously.
5. The method of claim 4, wherein at least 20 eggs are activated.
6. The method of claim 1, wherein the activation is by inducing parthenogenesis in the avian egg.
7. The method of claim 6, wherein parthenogenesis is induced by penetration of the yolk membrane.
8. The method of claim 7, wherein the penetration is achieved by a needle.
9. The method of claim 1, wherein the activation is achieved by delivering a sperm sample comprising avian sperm in a physiologically acceptable carrier into the egg.
10. The method of claim 9, wherein the egg and the sperm are derived from members of the same species.

11. The method of claim 9, wherein the carrier is seminal fluid.
12. The method of claim 9, wherein the carrier is diluted seminal fluid.
13. The method of claim 12, wherein the diluted seminal fluid comprises Avidiluent.
14. The method of claim 10, wherein the sperm sample is delivered adjacent to a membrane enclosing the yolk.
15. The method of claim 14, wherein the sperm sample is delivered adjacent to a region of the membrane that is adjacent to a germinal disc.
16. The method of claim 10, wherein the sperm sample is delivered beneath the membrane.
17. The method of claim 10, wherein the membrane is treated so as to allow the sperm to fertilize the egg.
18. The method of claim 10, wherein the avian species is selected from the group consisting of chicken, quail, duck, turkey, pheasant, ostrich, goose, and rhea.
19. The method of claim 18, wherein the avian species is chicken.
20. The method of claim 10, wherein the sperm sample comprises a mixture of sperm obtained from more than one bird.
21. The method of claim 10, wherein the delivery of the sperm sample is achieved by creating an opening in the shell by penetrating the shell and introducing the sperm sample into the egg.

22. The method of claim 21, wherein penetration and introduction are achieved with a needle.
23. The method of claim 21, wherein the opening is sealed.
24. The method of claim 23, wherein the opening is sealed with an adhesive.
25. The method of claim 10, wherein multiple eggs are fertilized substantially simultaneously.
26. The method of claim 25, wherein at least 20 eggs are fertilized.
27. The method of claim 25, wherein at least 50 eggs are fertilized.
28. The method of claim 10, wherein the egg is a chicken egg, and incubation of the egg lasts from 21 to 23 days.
29. The method of claim 10, wherein incubation is performed at a temperature of about 99.5°F from day 1 to about day 18 of incubation and a temperature of about 98.5°F from about day 19 of incubation to hatching.
30. The method of claim 10, wherein incubation is performed at 80% humidity from day 1 to hatching.
31. The method of claim 10, further comprising vaccinating the embryo during incubation.
32. A method of fertilizing an oviposited avian egg in a shell, wherein the egg comprises a yolk enclosed by a membrane, comprising:
- a) obtaining a sperm sample comprising avian sperm in a

physiologically acceptable carrier; and

- b) delivering the sperm sample into the egg, so as to fertilize the egg.

- 33. The method of claim 32, wherein the egg and the sperm are derived from members of the same species.
- 34. The method of claim 32, wherein the carrier is seminal fluid.
- 35. The method of claim 32, wherein the carrier is diluted seminal fluid.
- 36. The method of claim 35, wherein the diluted seminal fluid comprises Avidiluent.
- 37. The method of claim 32, wherein the sperm sample is delivered adjacent to a membrane enclosing the yolk.
- 38. The method of claim 37, wherein the sperm sample is delivered adjacent to a region of the membrane that is adjacent to the germinal disc.
- 39. The method of claim 32, wherein the sperm sample is delivered beneath the membrane.
- 40. The method of claim 32, further comprising treating the membrane so as to increase fertilization.
- 41. The method of claim 33, wherein the avian species is selected from the group consisting of chicken, quail, duck, turkey, pheasant, ostrich, goose, and rhea.
- 42. The method of claim 41, wherein the avian species is chicken.

43. The method of claim 32, wherein the sperm sample comprises a mixture of sperm obtained from more than one bird.
44. The method of claim 32, wherein the delivery of the sperm sample is achieved by creating an opening in the shell by penetrating the shell and introducing the sperm sample into the egg.
45. The method of claim 44, wherein penetration and introduction are achieved with a needle.
46. The method of claim 44, wherein the opening is sealed.
47. The method of claim 46, wherein the opening is sealed with an adhesive.
48. The method of claim 32, wherein multiple eggs are fertilized substantially simultaneously.
49. The method of claim 48, wherein at least 20 eggs are fertilized.
50. The method of claim 48, wherein at least 50 eggs are fertilized.
51. A method of fertilizing a chicken egg in a shell, wherein the egg comprises a yolk enclosed by a membrane, comprising:
- a) obtaining a chicken sperm sample in a physiologically acceptable carrier; and
  - b) delivering the sperm sample into the egg, so as to fertilize the egg.
52. A method of fertilizing a chicken egg in a shell, wherein the egg comprises a yolk

enclosed by a membrane comprising:

- a) obtaining diluted chicken sperm; and
- b) delivering the diluted sperm into the egg, so as to fertilize the egg.

53. A method of fertilizing a chicken egg in a shell, wherein the egg comprises a yolk enclosed by a membrane comprising:

- a) obtaining diluted chicken sperm; and
- b) delivering the diluted sperm into the egg by penetrating the shell and introducing the diluted sperm into the egg.

54. A method of fertilizing a chicken egg in a shell, wherein the egg comprises a yolk enclosed by a membrane comprising:

- a) obtaining diluted chicken sperm; and
- b) delivering the diluted sperm into the egg adjacent to a region of the membrane that is adjacent to the germinal disc, by penetrating the shell and introducing the diluted sperm into the egg.

55. A method of fertilizing an oviposited chicken egg in a shell, wherein the egg comprises a yolk enclosed by a membrane, and hatching a live chick, comprising delivering a chicken sperm sample in a physiologically acceptable carrier into the egg, so as to fertilize the egg and incubating the egg until hatching.

56. A method of fertilizing an oviposited chicken egg in a shell, wherein the egg comprises a yolk enclosed by a membrane, and hatching a live chick, comprising delivering diluted chicken sperm into the egg, so as to fertilize the egg and incubating the egg until hatching.

57. A method of fertilizing an oviposited chicken egg in a shell, wherein the egg

comprises a yolk enclosed by a membrane, and hatching a live chick, comprising delivering diluted chicken sperm into the egg by penetrating the shell and introducing the diluted sperm into the egg, so as to fertilize the egg and incubating the egg until hatching.

58. A method of fertilizing an oviposited chicken egg in a shell, wherein the egg comprises a yolk enclosed by a membrane, and hatching a live chick, comprising delivering diluted chicken sperm into the egg adjacent to a region of the membrane that is adjacent to the germinal disc by penetrating the shell and introducing the diluted sperm into the egg, so as to fertilize the egg and incubating the egg until hatching.

59. An oviposited avian egg comprising a native embryo having fewer than 30,000 cells, wherein the embryo can develop into a live chick.

60. The egg of claim 59, wherein the embryo has fewer than 20,000 cells.

61. The egg of claim 59, wherein the embryo has fewer than 10,000 cells.

62. The egg of claim 59, wherein the embryo is a zygote.

63. The egg of claim 59, which is a chicken egg.

64. An oviposited chicken egg comprising a native embryo having fewer than 30,000 cells, wherein the embryo can develop into a live chick.

65. An oviposited chicken egg comprising a native zygote.

66. An oviposited avian egg comprising an embryo having fewer than 30,000 cells, wherein the embryo can develop into a live chick and wherein the egg shell has an opening less than 4 centimeters.

67. The egg of claim 66, wherein the embryo has fewer than 20,000 cells.
68. The egg of claim 66, wherein the embryo has fewer than 10,000 cells.
69. The egg of claim 66, wherein the embryo is a zygote.
70. The egg of claim 67, wherein the opening is sealed.
71. The egg of claim 67, wherein the opening is less than 1 centimeter.
72. The egg of claim 67, wherein the opening is less than 5 millimeters.
73. An oviposited chicken egg comprising an embryo having fewer than 30,000 cells, wherein the embryo can develop into a live chick and wherein the egg shell has an opening of less than 4 centimeters.
74. An oviposited chicken egg comprising an embryo having fewer than 20,000 cells, wherein the embryo can develop into a live chick and wherein the egg shell has an opening of less than 1 centimeter.
75. An oviposited chicken egg comprising a zygote, wherein the zygote can develop into a live chick and wherein the egg shell has an opening of less than 4 centimeters.
76. An oviposited chicken egg comprising a zygote, wherein the zygote can develop into a live chick and wherein the egg shell has an opening of less than 1 centimeter.
77. An egg produced by the method of claim 9, wherein the egg comprises a zygote.
78. An oviposited chicken egg comprising a native yolk and an embryo having fewer



than 30,000 cells, wherein the embryo can develop into a live chick.

79. An oviposited chicken egg comprising a native yolk and an embryo having fewer than 20,000 cells, wherein the embryo can develop into a live chick.

80. An oviposited chicken egg comprising a native yolk and an embryo having fewer than 10,000 cells, wherein the embryo can develop into a live chick.

81. A method of producing an avian embryo containing heterologous nucleic acid, comprising introducing heterologous nucleic acid into an avian egg produced by the method of claim 1.

82. A method of producing an avian embryo containing heterologous nucleic acid, comprising introducing heterologous nucleic acid into an avian egg produced by the method of claim 9.

83. The method of claim 81, wherein the heterologous nucleic acid encodes a pharmaceutical protein, an antigen, a hormone or an antibody.

84. The method of claim 82, wherein the heterologous nucleic acid encodes a pharmaceutical protein, an antigen, a hormone or an antibody.

85. The method of claim 81, wherein the heterologous nucleic acid comprises Avian Leukemia Virus-derived transducing particles.

86. The method of claim 81, wherein the heterologous nucleic acid encodes a protein.

87. The method of claim 81, wherein the heterologous nucleic acid is stably integrated into the avian genome.